POPULAR MECHANICS

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"Tells you how to do things." Written so you can understand it.

Smithsonian Institution

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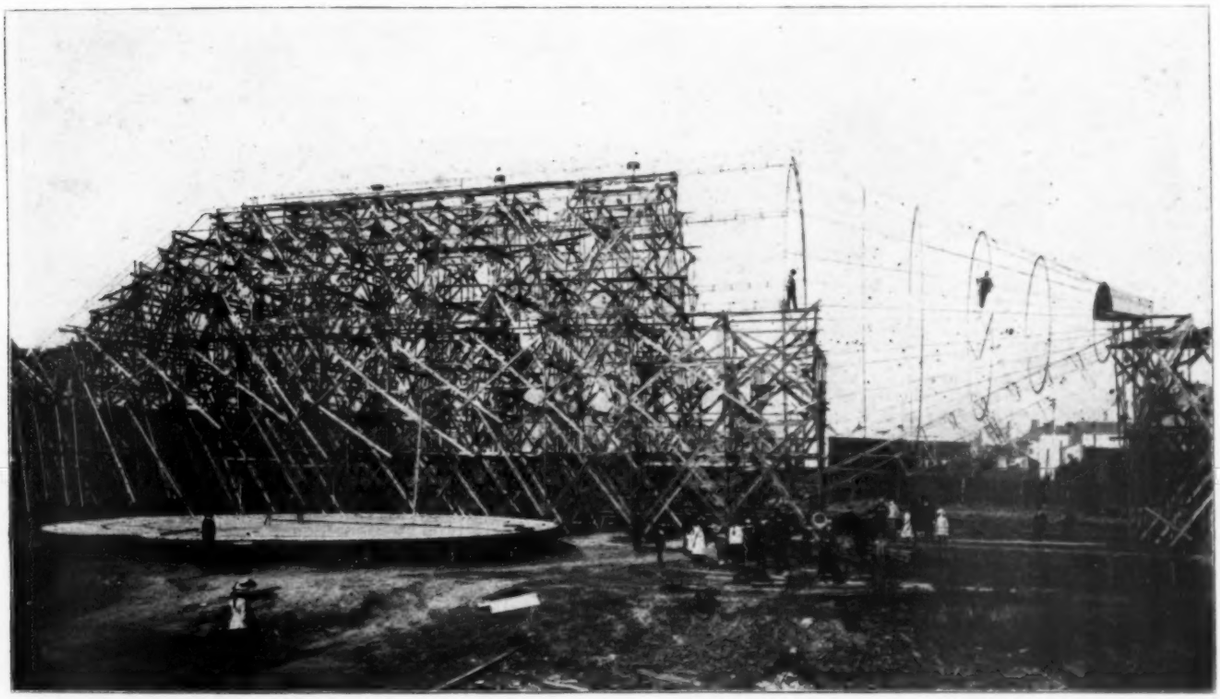
Building First Airship for St. Louis Aerial Races



The "Stanley," a Monster Aluminum Vessel in Course of Construction at San Francisco

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Crookedest Railroad in the World.
Remarkable Increase in Cotton Production. The Manufacturer's Building.

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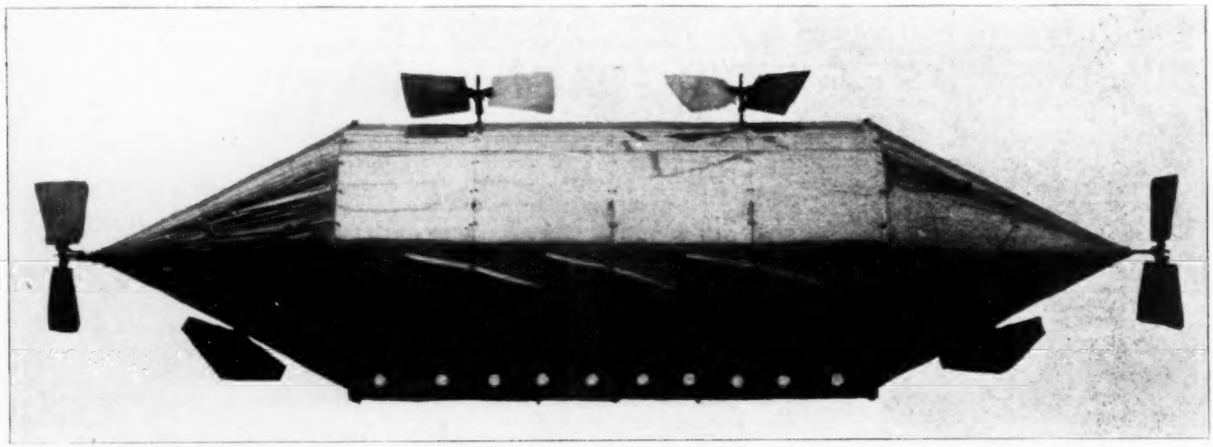
Great Airship Being Built at 'Frisco

It is to Be 228 Feet Long, is of Aluminum and Will Cost $200,000

Out in San Francisco a monster aluminum airship 228 feet long is being built. It is called the Stanley airship and is named for its inventor who is spending a fortune in its building. A whole block in San Francisco, bounded by Baker, Fell, Lyon and Hayes streets, is given up almost entirely to the shipyards where the colossal machine is now under construction. The Stanley ship is to be a contestant for the $200,000 prize offered by the St. Louis world's fair. Mr. Stanley's friends and nearly every one in San Francisco confidently believe that this great flying vehicle is to solve the problem of aerial navigation.

A great advantage claimed for the ship is the fact of its being built of aluminum. The new method of producing aluminum that it can be sold cheaply enough for such a large enterprise, and the invention of engines light in weight but stronger in proportion to those heretofore obtainable are agencies that aided materially in the building of the airship. Other advantages claimed are: the manner of propulsion; control over elevation, ability to descend at will and adjustable propeller shades.



The "Stanley" as It Will Appear In Flight.

The Stanley airship will be cylindrical in shape and pointed at both ends. The body or cylindrical portion will be 116 feet in length and 56 feet from base to apex, making a total length between the points of the cones of 228 feet. It is divided longitudinally into two parts by a partition running the full length of the ship 12 feet above the keel. The lower part is to contain the motive power, machinery, passengers, freight, mails and whatever is to be carried. The upper part is to be divided into six compartments, which are to contain hydrogen gas to elevate the ship. Each compartment will contain an inner skin of silk, which will simplify the manner of filling these compartments and make the ship doubly secure against the leakage of gas.

The lifting capacity of the gas is 21,000 pounds. The weight of the ship, including machinery, will be 13,000 pounds. The ship will carry at least thirty passengers, together with their baggage, provisions, etc.

It is plain to be seen that the shape of the ship is such as to offer the least resistance in being driven through the air.

The propellers, placed as they are at the apex of each cone, being in a direct center, will have a much greater power in driving the ship backward and forward through the air than if placed on the sides of the airship, or to a suspended car below, as is the case with all other airships in existence.

A rudder placed under each cone will guide the ship to right or left. A series of side planes or side rudders placed along the sides of the ship will elevate the ship to a higher altitude in going forward than the gas has lifted it; for instance, when passing over a mountain range.

A special feature in connection with the uses to be made of the "side planes" is the ability of the vessel to rise in going forward, and still maintain a horizontal position.

The main feature, however, of the invention is the top propellers, which will control the ship in rising and force it down, without letting out the gas, to make a landing at any time and place desired.

THE FIRST STEAM CRUISER.

It Was Also the First Steamship Engaged in Actual War.

It is generally known that the first steam driven vessel to cross the Atlantic was built in Canada, says the Draftsman. The information is not so general, however, that this same craft was subsequently converted into a cruiser and was the first steamship engaged in actual war.

The facts in the case are stated in "Johnson's Alphabet of First Things in Canada." The ship was the Royal William. She was built at the Cove, Quebec, in the winter of 1830-31, and during the season of 1832-33 plied between Quebec and Halifax. In the latter season she was sent to London and there chartered by the Portuguese government to transport troops intended for the service of the late Dom Pedro to Brazil. Returning to London, she was sold to the Spanish government, by the latter converted into a cruiser and employed against Don Carlos in the civil war of 1836, thus being the first steamer to fire a hostile shot.

MAKES THE DEAF TO HEAR.

Murray Atkinson, living near Rockport, Ind., has invented a contrivance by which, he says, a person who is totally deaf can hear, and that a person who was born deaf can acquire the sense of hearing. John Park, a well-known citizen, who has been totally deaf for twenty-five years, has experimented with the device, and says he could hear with it.

The contrivance includes a small, hard rubber capsule, not over two inches in length, and about the size of a lead pencil. This is placed in the ear, and two fine wires connect it with an induction coil. When the current is turned on, the electricity affects the auditory nerve. Mr. Park could distinguish increases and decreases in the sound as the current was changed. The experiment caused no irritation of the nerve centers.

Atkinson will now undertake a transmitter to convey sound to the ear. He says the device is an application of the Hertzian waves. Atkinson says that he will, when the contrivance is perfected, have it so small that it can be carried in a pocket.

LINER COLLIDES WITH A WHALE.

The Leviathan Lost Its Life and the Passengers Lost Their Wits.

Even with the modern ocean greyhounds and their sharp steel prows the whale must yet be accorded some rights at sea. They cannot be disregarded by seamen for to do so may invoke disaster as was demonstrated a short time ago by an incident that befell the ocean liner, Sierra. The Sierra was speeding along between Auckland and Sydney at 16 knots an hour when it was brought to a sudden stop. The passengers and crew received a severe jolt and for a time great alarm was felt. Investigation showed that the huge body of a sperm whale was stuck firmly on the vessel's stem. The whale was struck squarely in the middle. Its back was broken and the stem had cut so deeply into its carcass that the leviathan could not be thrown off until after much hard work on the part of the officers and crew, and the reversing of the engines.

The old California & Nevada line is to be reconstructed by the Santa Fe.

Panama Canal Means America Supreme

All Nations Must Bow in Homage to the Supereminence Its Building Will Bring

The treaty between the United States and Colombia providing for the construction of the Panama canal has been signed. The building of this canal will be an engineering feat to be performed by America that can be compared only with the masterly achievements of the ancient world—the building of the pyramids, the temple of Diana at Ephesus, the mausoleum of Artemisia and other wonders of a by-gone civilization and of the world. It will place America preeminently above all other nations in power, strategic importance and in commerce. It divides the Western continent into two separate continents, in truth—the North American and the South American—but while it separates the Americas geographically, it unites them sentimentally, commercially and nationally. It means that the government at Washington will in time have domain extending from the arctic circle to the equator.

The building of the Panama canal will be the greatest step of progress the United States has ever taken. It marks a new era in our history; it is the beginning of a new day for all the Americas and the old ways and conditions round about our seas and lands will never more be the same.

That is why Germany is hounding about down there in Venezuela now; she sees the handwriting on the wall and is loth to give up the feast on tropical wealth she has so long enjoyed; but Germany, England, and our good friend France, and all must now surrender the Americas to America, unequivocally, unconditionally. Of course Germany lets go the bone with a snarl, but a snarl does not frighten Uncle Sam.

It will be fifteen or twenty years before the canal is finished and becomes a highway for our ocean commerce. The immediate results of its completion will be to give the United States absolute control of the trade of entire west coast of South America, and as advantages accrue from advantages the other conditions mentioned will follow.

The building of the canal means that New York is to become the metropolis and the commercial center of the world. Without the canal the honor might have befallen San Francisco, whose turn to supremacy may yet be next after New York's day has passed. New Orleans, our southern metropolis, which has let city after city slip by her in the commercial race until she has fallen back from a close second to twelfth place in rank, is to be imbued with new life from the fresh and verdant fields the new canal will give her to subsist on. The canal will transfer the trade of western South America from London, Paris and San Francisco to New York and New Orleans. New Orleans will become the ocean port of Chicago. All agricultural implements and other commodities from Chicago and the Ohio will be shipped by way of New Orleans and no longer by way of New York and Newport News. New Orleans is about 600 miles nearer the Panama canal than New York. Water transportation down the Mississippi may, therefore, again become an important factor and the Chicago sanitary and ship canal ought to become a considerable feature in an interior system of waterways.

As compared with the old routes through the straits of Magellan, the Panama canal will cut down the distance to Honolulu 6,500 miles; to Melbourne 2,800 miles; to Valparaiso 4,900 miles, and to San Francisco, 7,800 miles. The distance from New York to San Francisco by water now is 13,090 miles. By way of the Panama canal the distance will be reduced to 5,280 miles, or much less than twice the regular route from New York to Liverpool. This makes ocean transportation from New York to San Francisco an actual factor to be considered for the future and the competition must, of course, be met by the railroads as soon as the canal is open for business.

The total cost of the canal to the United States will amount to about $170,000,000, of which $40,000,000 will be paid to the Panama Canal Company of Paris; $120,000,000 for construction, $10,000,000 to the Republic of Colombia and an indefinite sum to be used in purchasing outstanding securities in the Panama railroad. After the expiration of nine years the United States is required to pay a rental of $250,000 per year to Colombia. The lease to the strip of land to be used for the canal and for canal purposes is practically made perpetual. The provisions are that the first lease shall be for 100 years and renewable thereafter in terms of 100 years at the pleasure of the United States. The strip is to be six miles wide and over this territory the United States is given police and sanitary jurisdiction and also control of the Panama railroad.

MANANA.

My friend, have you heard of the town of Yawn,
On the banks of the River Slow,
Where blooms the Waitawhile flower fair,
Where the Sometimeorother scents the air,
And the soft Goeasys grow?
It lies in the valley of Whatstheuse,
In the province of Letherslide;
That tired feeling is native there,
It's the home of the listless Idontcare,
Where the Putitoffs abide.
The Putitoffs' smile when asked to invest,
And say they will do it to-morrow;
And so they delay from day unto day,
Till death cycles up and steals them away,
And their families beg, steal or borrow.

228,000 PIANOS MADE IN 1902.

Two hundred and twenty-eight thousand pianos were made in the United States last year, according to Presto, an authority in the music trade. This stupendous number made, sold and delivered in twelve months is certainly a sign of good times and a growing desire for music in the home. There were made in Chicago, 65,025 pianos; New York, 83,875, and Boston, 22,150; elsewhere 56,950. Chicago made one-eighth and New York more than one-third of the whole number.

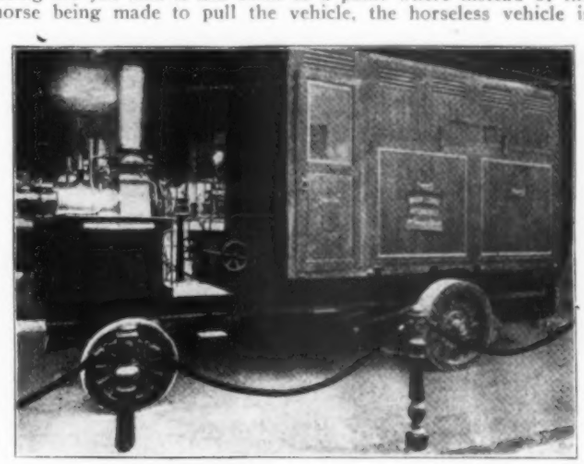
To conduct experiments with various types of searchlights, the navy department will erect in the New York navy yard a steel tower 260 feet high, at a cost of $100,000.

Smoke consuming devices are to be adopted for all locomotives of the New York Central railroad.

HORSES RIDE IN HORSELESS VEHICLES.

Instead of Drawing the Carriages, in Paris the Carriages are Made to Haul the Horses.

In Paris, the home of the automobile, the horse is so rapidly losing his job that it has come to a point where instead of the horse being made to pull the vehicle, the horseless vehicle is



Horseless Vehicle for Horses in Paris.

being made to haul the horse. This is the most ignominious blow that has yet been struck at the faithful animal that served our purpose so well until the "chuff-chuff" wagon came. This horseless vehicle, made to carry horses is shown in the accompanying illustration. Its passengers are principally race horses which are tranported to and from the tracks during the Paris races. It also serves for the transportation of disabled animals in the streets of Paris. The car is manufactured by the Turgan et Foy Company.

TWO-STORY STREET CARS.

The English people delight to ride in the upper story of the double-deck street cars they have over there. These cars have been tried in this country and were a positive failure. Heretofore the seats on top the car were uncovered, being exposed to sun and storm, and the favorite occupation of the English inventor when he had nothing else to do has been to invent seats which would keep dry when not in use. It has even been claimed that enough of these rain-shedding seats have been

Queer Street Cars in England.

thought out to seat the entire population of London. It has just dawned on somebody that by building a roof and sides, the same as down stairs, protection from the weather can be secured. We illustrate this latest construction. By using a "lift" they may yet have sky-scrapers, ten cars high.

EXTENT OF THE LIGHTHOUSE SERVICE.

The full extent of the lighthouse service can best be appreciated by simply stating that there are some 9,000 warning lights and signals stretched along the American coasts, forming a perfect link so that the navigator need never be beyond the sight of one of the beacons. Of this grand total—including lighthouses of different classes, buoys, beacons, and danger signals—over 3,000 are lighted, giving forth their signals at night time. One thousand of these lights are located on the Atlantic coast, 1,500 are scattered along the rivers and inland waterways, 500 on the Great Lakes, and 200 on the Pacific Coast.

To clean silk, wool and cotton fabrics, grate two good sized potatoes into one pint of clear, soft water; strain through a coarse sieve into one gallon of water and let the fluid settle. Pour the starchy fluid from the sediment and in it rub the articles to be cleaned; rinse thoroughly in clear water, dry and press.

Bids are invited by the municipal authorities of Callao, Peru, for the supply of 2,400 tons of straight cast-iron pipes, varying from 2½ inches to 21 inches in diameter, and also for a quantity of special castings, tees, crosses, valves, hydrants, etc. Specifications can be obtained from Graham, Rowe & Company, Mersey Chambers, Liverpool, England. A fee of $25 is insisted upon, which is to be returned on receipt of a bona fide bid.

WESTINGHOUSE ON AMERICAN WAYS.

Tells How Electricity and 4,000 Men in America Do as Much as 45,000 in Germany.

George Westinghouse was given a banquet in London, by leading railway men, financiers and scientists. Replying to the introduction by Lord Kelvin, he said in part:

"In America, however, we have always been short-handed with regard to labor. We have been obliged to find methods whereby one man may accomplish the work of two or three men as compared with your practice here. We have had the best men from Europe: Englishmen, Germans, French, everybody—skilled men, highly trained men, as well as laboring men; we have combined their experience with our own, coupled it with our necessities, and have thus accomplished results unattainable in a country like this where you have more labor than you can well keep employed.

"An illustration of what has been accomplished by the use of electricity is seen in the Homestead mills of the Carnegie company, where they produce with about 4,000 men three times as much steel as the Krupp works produce with 15,000 men. The results are simply wonderful. You can start there today, in a building containing steel-melting furnaces, and you will there see three men mounted on a car with the charging apparatus which is moved and operated by electricity. With a few movements of this ingenious contrivance three men charge twenty furnaces, which prior to the use of electricity, would have required the labor of over 200 men.

"You may go into the yard of the Homestead mills where they pile the metal in stock. This yard is covered by a system of overhead cranes, and the result is that not only here, but in the mill, and in every other place, you may see great weights lifted and many undertakings going on without a single man exerting himself a bit—working not half as hard as I am working now.

"I took some English friends to Homestead, where they turn out 750 tons of plate girders per day. The mill was in the shape of an 'L.' We went into the short end of the 'L' where the furnaces were fed by natural gas, of course requiring no stokers. The end at which we entered had a rather low roof, and there was a slight contivance like a battering ram in front of the furnaces; two workmen were sitting down eating their dinners near by; no one else was present. Apparently the mill was not in operation. But we went through the mill, which was about 200 feet long; and suddenly heard a rattle and then saw a truck approaching loaded with a big ingot. No one touched the truck or the ingot. The load came to a platform, the crane overhead dropped a pair of tongs and quickly put the ingot on the roller table, and as it moved along to the great rolls, it was automatically kept in place. The adjusting screws of the rolls were turned by little electric motors, and not a man in that house did a bit of work. It was just as easy as what you are doing now—looking on! We went back to the furnaces. There was a fifteen-year-old boy seated in a little place called the 'pulpit.' He was able, merely by the movement of levers, to open at will any of the furnace doors and move the car along. And we saw this car come in front of a furnace and the charging machine approach, and take out of the open furnace a hot ingot which was dropped on the car and moved off to its work. There was this boy doing absolutely no hard work, and his mill was turning out 750 tons of steel plate each day. My English friends said: 'England has no chance in competition with such methods.'

"At the Carnegie mills we went to see three blast furnaces. They were making 1,800 tons of pig-iron in twenty-four hours. We saw only two or three men on a truck which was moved automatically. These men were letting the ore run from shoots and mixing it in the required quantity, and when they had filled a truck, it was carried up and its contents dumped into a furnace whence it returned for another load. They were running the metal into an immense receptacle into which the metal from all three furnaces was mixed. From this place the metal was taken as required, put into a special tank, mounted on a car and taken to Homestead, two or three miles away, to be poured into the furnaces; one heating only was required.

"Now all this sort of thing came about in America because of our necessities. We hadn't men enough to do our work. There was a premium in favor of those who could invent machines to work and thus supply the deficiency."

The Chicago automobile numbering ordinance provides that all public conveyances of the "horseless" type must display a number four inches high and, in addition, a letter that will serve to identify the operating firm. Vehicles run by individuals for pleasure are required to display simply a number which will correspond with the number of their license.

GERMAN'S VIEW OF AMERICA.

After Touring Our Country He Compares It to an Enchanted Garden.

By the Hon. Ludwig Max Goldberger of Berlin, Royal Privy Councilor of Commerce and Member of the Imperial German Board of Commercial Measures, who has recently made a tour of the United States.

"The United States, like an enchanted garden, has brought forth from a marvelously productive soil splendid results of human ingenuity. Yet the thing that causes most wonder is that the concentrated intelligence which intended to replace human factors by machinery has, in working towards its aim, been giving to constantly growing numbers of workmen an opportunity to support themselves and become productive factors. The joy at the size of their own land encourages each individual. It makes him communicative and friendly to foreigners who are seeking information. It seems as though everyone were filled with the idea: 'The stranger shall see how great and strong America is.' Everywhere I found open doors inviting me to enter, and nowhere did I find the slightest attempt at secretiveness. Everywhere I observed an uncommon but steady bustle of men who enjoy their work and are consciously working for great results.

Sailors have a very simple, and what is said to be a very effective way of determining the edible or nonedible qualities of any new varieties of fish they may happen to run across. In the water in which the fish is boiled is placed a bright silver coin. If the coin retains its natural color during the boiling process the fish is good to eat. But if it turns dark, the food is rejected.

Edison says he will give up practical invention for the next two years and devote the time to experiments.

Laundry Girls in the Philippines

They Do Their Work in the Rivers, Are Good Swimmers, But Not as Winsome as in America

Laundry girls in the Philippines are not as chic and tidy as in this country and their work is not as fascinating. They do not have the steam about them to clear their complexions and make them so fair of face. There they have to wade and swim out into the streams and sitting or squatting about on boats and rafts that they can find in the river separate the dirt from the garments by pure physical exertion. Filipino laundry girls never suffer from lack of exercise, but still they are not as hardy as our American laundry girls. They do not care so much for their personal appearance, either, as can be seen from the accompanying illustrations. All of them are good swimmers. They take the clothes they are to wash under their arms, wade as far as they can and then with the bundle on their head swim the rest of the way to where the boat is anchored across stream. If the boat should pull out in the midst of their work they hurriedly gather up the clothes again and swim ashore. The Filipino laundry girls always go barefooted and wear as little clothing as possible to facilitate their swimming.

The accompanying illustrations furnish typical scenes of laundering in the Philippines. As in one of the pictures here shown the girl often doffs her skirt to facilitate her movements. The laundering is done without tub or washboard, the clothes being scrubbed on timbers to wash out the dirt. After the scrubbing is finished the clothes are laid on the top of boats or rafts or hung in trees to dry and bleach. These are the only kind of laundries that may be found in the Philippines outside of the large cities. The soap used is made from lye produced from ashes of wood.

Filipino Laundry Girls at Work.

Surveys are being made for two railroads to traverse the undeveloped coal regions of southern Illinois.

Filipino Laundry Girls Washing Clothes on a Raft.

The Transvaal, South Africa, is oversupplied with mechanics, and many are unemployed.

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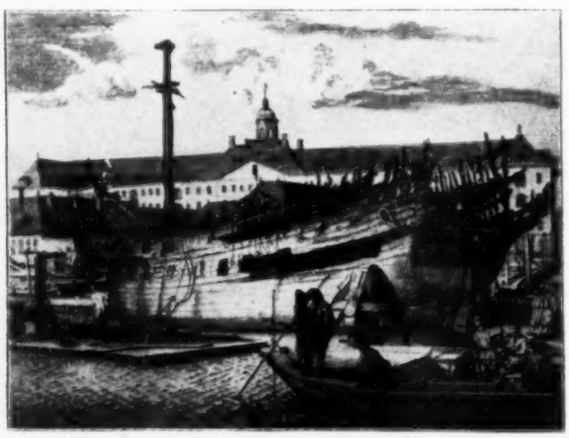
FIRST FLOATING FIRE ENGINE.

Earliest on Record Were Hand-Propelled Boats Equipped With Hand Pumps.

Long before the advent of floating steam fire engine, fire boats and fire floats were propelled by men and the pumps were worked by hand. The first of these hand-propelled boats and floats of which there is a record is shown in the accompanying illustration. The engraving is made from an old print and shows one of the floating engines at work on a ship belonging to one of the East India lines which caught fire while lying at dock in a German harbor, May 14, 1683. This is the earliest print known that shows either of these earlier types of fire-fighting apparatus. When these floating engines first came into use is not known. They are believed to be as old as the hand-worked fire-engine itself. The fire boats in those days were the property of the insurance associations.



German Fire Boats at Work in 1683.

The first steam fire boat was constructed in London by John Braithwaite and Capt. John Ericsson in 1835.

The Fireman's Herald says: "Braithwaite submitted to the London Fire Engine establishment a design of this boat which after some months was returned to him with a letter of thanks declining the same, for the same reasons that they refused his steam fire engine—that it would be too powerful for common use and as the quantity of water thrown might be injudiciously applied cause mischief. A very poor excuse, indeed."

BALLOON PHOTOGRAPHED WHEN 3,000 FEET HIGH.

A balloon which ascended to a height of 5,000 feet from a park in Santa Clara county, California, recently, was photographed in its upward flight when it was 3,000 feet above the earth. The snapshot was caught from a mountain peak as the aerial craft swept by, with the daring aeronaut swinging to the trapeze just

Balloon 3,000 Feet in Air.

before making the parachute leap. The picture that resulted is herewith reproduced. Huge volumes of smoke were pouring from the mouth of the balloon when the picture was taken, as may be seen from the illustration. The baloon was inflated by heated air and coal oil gas.

"STREET CAR PARADE" THE LATEST.

Indiana Company Starts a Style That Promises to Become Popular.

Did you ever hear of a "street car parade?" That was the style of an attraction given by the Evansville Electric Railway Co., at Evansville, Ind., recently, and it was an amazing success. Not only did it net the company a handsome revenue, but in revealing the material improvements that had been made in the service in the people's behalf, it served to place the railway in a better light before the public than ever before.

The parade consisted in arranging in a graduated line the different cars used on the streets of Evansville since 1892. First came the old-fashioned one-mule car with its four wheels, then the other early types of cars in order with the splendid, latest improved electric heated trolley bringing up the rear.

H. D. Moran, general manager of the railway company, says: "In our advertisement we announced only one street for a space of about four blocks where the parade might be seen, and notwithstanding the inclement weather we had at least 5,000 people along the line of march. The increase in revenue was eminently satisfactory, and the passing before the people in parade in regular sequence of the types of rolling stock used ten years ago and at intermediate periods up to date, has made a very marked and favorable impression and had a tendency to augment the friendly feeling for the company already existing."

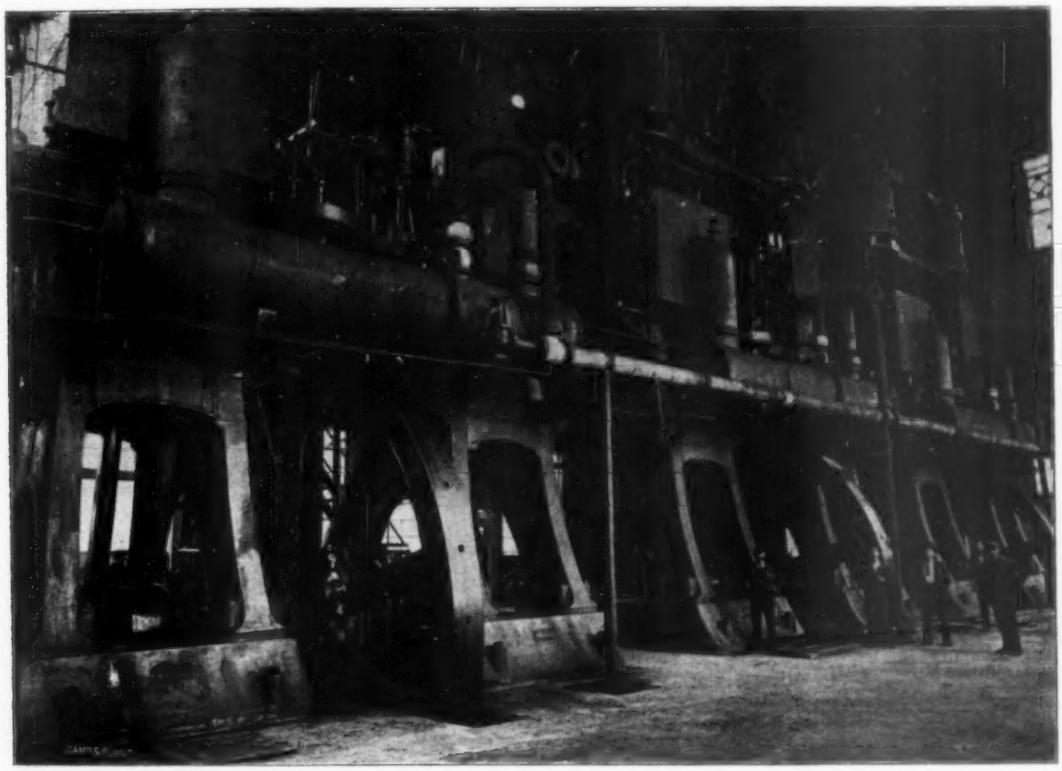
The Messenger of Finance of St. Petersburg, Russia, says that 1,414,833 tons of pig iron were smelted in European Russia during the first six months of last year.

Engine Cylinders 7½ Feet in Diameter

Boy Could Ride Through Them on a Horse and Have Room to Spare

Think of an engine cylinder large enough for a boy on a pony to ride through with plenty of room overhead! Such is the size of the low-pressure cylinder of the blowing engine for blast furnace A of the Colorado Fuel & Iron Co.'s plant. These great engines are of the vertical cross-compound, condensing, quarter-crank, steeple type. Camp and Plant, the interesting weekly published by the sociological department of the Colorado Fuel & Iron Company, states:

"The steam cylinders are 44 and 90 inches in diameter, with 60-inch stroke; the two air cylinders are 90 inches in diameter. The total weight of each engine is about 1,000,000 pounds. Each pair of furnaces is provided with five engines, one of which is used as a reserve. It is noteworthy that the low-pressure cylinder is 90 inches, or 7½ feet, in diameter."



Colossal Blowing Engines of the Colorado Fuel and Iron Co.'s Plant.

Other of the great things connected with this huge plant will be described in future issues of Popular Mechanics.

Future of the Automobile

Soon Its Position Will Be Reversed and it Will Be the Conveyance of the Laborer

By Arthur Brisbane, of the New York Evening Journal.

In less than fifty years from now the working man, the mechanic and the laborer will go to their work from their cottages in the country in automobiles.

You smile at this?

Don't smile too confidently.

Do you remember when the present model of bicycles first came into fashion?

Who used and paid for the first bicycles, at one hundred dollars or more each?

The rich men and women.

Who made fun of the first bicycle riders, laughing at their sensible costumes, throwing tacks on bicycle paths, doing everything to delay the manufacture of the cheap bicycle by discouraging those who paid for the first experiments?

You did, you who now laugh, or throw tin cans at the fast automobile did the same for the bicycle, not so many years ago.

And who uses the bicycle now? Get up early in the morning, especially in the country, and you will see the bicycle carrying the mechanic to his work. The cheap bicycle is almost exclusively used by working men. It is used exclusively by people of moderate means.

The rich have long since tired of it. The bicycle at Newport used to fill the foolish "society" columns. It now carries the butcher boy to and from work. It enables the workman to save his carfare, to get cheaper rent and fresh country air for his children by living far from his task. It gives these advantages, in addition to fresh air and daily exercise to thousands of clerks with small salaries.

Suppose that public jeering, sprinkling of tacks, etc., had prevented the development of the bicycle. The rich would simply have been deprived of one toy. They would never have missed it. The great loss would have fallen upon the poor, to whom the bicycle now offers many economical advantages, and their sole chance of reaching the country and of knowing nature's beauties.

A device for checking a vessel's speed in an emergency by means of fins controlled from the wheel house, which opens at right angles to the vessel's side, has been invented by L. J. Lacoste, son of Chief Justice Sir Alex Lacoste.

The journeymen plumbers of Providence, R. I., in collecting a library of trade publications and technical works relating to their trade, have set a good example that ought to be followed by other such organizations.

Steam radiators, having return connections should either be fitted with valves on both connections or should have no valves at all.

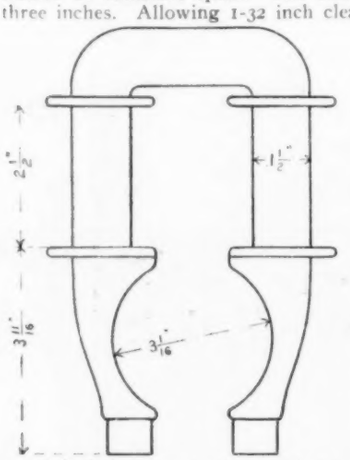
A fairly good balloon capable of carrying one person when inflated with hydrogen can be purchased for $300. A balloon to carry 20 persons would cost about $5,000.

Easy Electrical Experiments

By L. P. Dickinson

HOW TO MAKE A SMALL DYNAMO.—II

Having calculated the number and arrangement of conductors upon the armature, as described in the preceding chapter, we will next take up the necessary calculations for the field magnet. We will assume that it is to be of the bi-polar form, of the general shape shown in the accompanying figure. First, as to diameter of armature space. The outer diameter of armature is three inches. Allowing 1-32 inch clearance, the diameter of the armature space should be 3-16 inches. Next, how large should the core of the field magnet be? This will depend upon the strength of magnetic field that we are to force through it. There is a definite relation between the strength of magnetic field, the speed, the electromotive force and the conductors on the armature. In every dynamo, the product of the number of conductors on the armature, multiplied by the strength of field, is equal to the electromotive force in volts multiplied by 100,000,000 divided by the number of revolutions per second.



In one machine, the voltage at full load is to be 50. But allowing for an inevitable loss in the armature, we will assume voltage to be 55. This means a loss of 10 per cent, which is none too much for a small machine. Applying the rule just given, we multiply this by 100,000,000 and divide by 40 (the revolutions per second), getting as an answer 137,500,000. This represents the product of the number of conductors on armature by the strength of field. But we have already calculated the number of conductors (1,056). Consequently we have but to divide 137,500,000 by 1,056, giving us 130,200, the strength of field necessary to give us 55 volts at a speed of 40 revolutions per second.

Now how large shall be our field magnets? That depends on their material. If they were of cast iron they will be quite large. If we make them of cast steel, they will be much smaller. Consequently, we will make them of soft cast steel. This material will carry easily 88,000 lines of magnetic force for every square inch of cross section.

Since there will be a large amount of leakage of magnetism in so small a machine, the 130,200 lines of force will have to be increased considerably. Multiplying this by 1.2 gives us 156,240 as the number of magnetic lines to be sent through the field magnet.

Dividing this by 88,000 gives 1.77 square inches as the area of one field magnet core. Further calculation shows that the diameter must be 1.5 inches to give us this area. These dimensions are shown in the figure.

The next important dimension of the field magnet is its length parallel to the shaft of the armature. This length is determined solely by the allowable density of magnetism in the air gaps between armature and field. The magnetism has to cross a gap of 1-32 inch on each side of the armature. If we make the field magnet poles too short, the density in this gap will be too great. If we make them too long, we shall waste material. Their proper length is determined by allowing one square inch for each 20,000 lines of magnetic force that cross the air gap. So our air gap will have an area of 6.51 square inches, obtained by dividing 130,200 by 20,000. If we should take a string and measure the length of arc on field magnet, we should find it to be 3½ inches. Measuring the same arc on surface of armature, its length is 3⅜ inches. But since only half the surface of the armature is iron, the effective length of arc on armature is 1 23-32 inches. Taking the average of 1 23-32 with 3⅜ gives 2 18-32 inches as the effective length of arc across which the magnetism must cross. Knowing this length, and knowing that the area of air gap measured parallel to shaft must be 6.51 square inches; dividing the latter by the former, gives us a length a little in excess of 2½ inches. In order to make dimensions an even number, will call the length of pole piece parallel to shaft 2½ inches exactly.

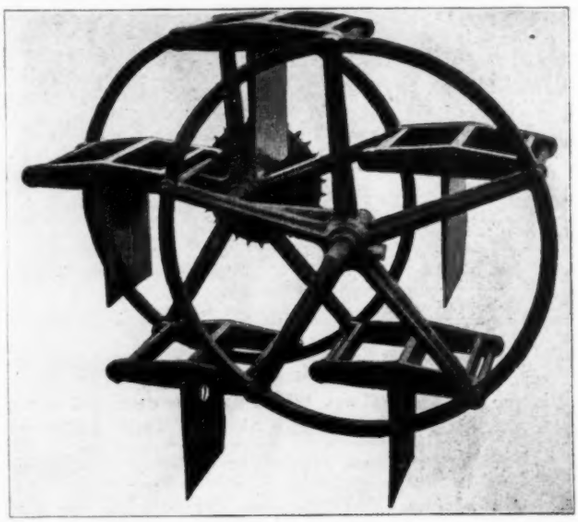
Our next chapter will be taken up with a calculation of field winding, and a consideration of practical details. The theoretical work thus far is simply to fix dimensions and shape, and the practical side will now be emphasized. The dimension given in the figure as 3 11-16, was derived from a consideration of diameter of armature and of clearance necessary to top and bottom of armature. At the bottom are two projecting lugs ¾ inch square for fastening field frame to base. The casting shown in figure is in one solid piece.

VERTICAL PROPELLER A UNIQUE DEVICE

Said to Produce Great Economy and Increase of Speed

A boat propeller, intended primarily for shoal water navigation to take the place of the stern wheel, the ordinary side wheel and the screw has been patented by Frank Exline, of Geddes, S. D. It is also proposed to test its power and economy for deep water. According to the inventor's claims it will result in a saving of from 25 to 40 per cent in fuel; it will increase the speed over paddle wheels by at least 25 per cent; and will have many other important advantages.

The American Shipbuilder in describing the equipment says: "Two wheels connected by trusses, compose one compound wheel and, as it revolves, all the trusses necessarily continue horizontal; while each rigid blade maintains a perpetually vertical position throughout its revolution. The bottoms of the wheels and trusses should, normally, be somewhat above the water line, only the vertical blades entering the water. Each blade enters, pushes through and leaves the water while passing round below the bottom of the wheel, and is suspended inside the wheel during the remainder of its revolution. Thus when the propeller is at work the several blades constitute a series of vertical planes moving successively against the water: hence the name "vertical propeller." The propeller in use is located in the stern of the boat, and driven by means of a sprocket on the hub of one wheel. But on larger boats it is equally as well, perhaps better, adapted to the ordinary side wheel plan.



Exline Vertical Propeller.

The gas engine came into existence some 200 years ago through experiments with gunpowder. Were the propulsive force occasioned by the discharge of a gun confined within the barrel and used to force a piston, the operation would be practically the same as the ignition of gas in the cylinder of a gas engine.

Marconi has been doing something else in Cape Breton besides conducting experiments with wireless telegraphy. He is said to have become enamored of the young and beautiful Nina, daughter of Dr. MacGillivray, one of Sydney's leading physicians.

Popular Mechanics "tells you how to do things."

Butter Manufacture in Porto Rico

First-Class American Dairy Would Doubtless Do Well on the Island

By Raymond A. Pearson, M. S., Assistant Chief of Dairy Division, Bureau of Animal Industry, U. S. Dept. of Agriculture.

Butter is not made in Porto Rico in sufficient quantities to have much effect on the market, and it is not sold in the better class of grocery stores where imported butter is on sale. It is produced in the crudest fashion by shaking milk or cream in a wide-mouth fruit jar and the finished product is generally heavily salted. Frequently the "cream" used for making butter consists largely of the scum of boiled milk and is but little richer in fat than normal milk. As neither ice nor cold water is used to reduce the temperature while "churning," the soft fat globules are not thoroughly separated from the casein and water and the butter contains a great excess of these constituents. Sometimes it is practically the same in composition and appearance as thick, sour cream. The analysis of a sample purchased in a milk shop showed less than 60 per cent of fat. It is difficult to describe the taste of this sample, but it was by no means free from acidity and rancidity.

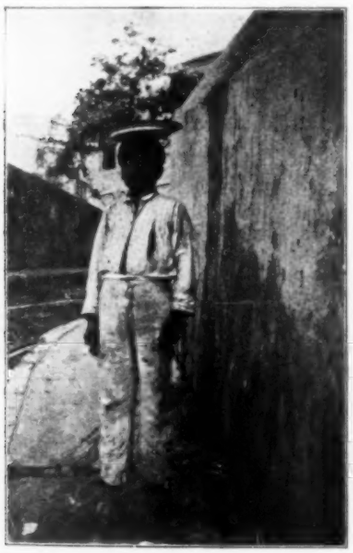
Early every morning small boys go through the streets of San Juan calling loudly "Mantequilla del Pais" (butter of the country). The stock of one of these little salesmen we questioned consisted of sixty small pats of "mantequilla" on a plate which he carried on his head. The pats weighed about two-thirds of an ounce each and were sold for 1 cent, making 24 cents per pound. This butter was found to contain as high as 64 per cent of water and less than 30 per cent of fat. The little fellow said he was given his meals and 10 cents a day for his work, but even this expense must have left some profit.

Returning to the Dairy After Serving Milk in Charlotte Amalie—From Raymond A. Pearson, U. S. Dept. of Agriculture.

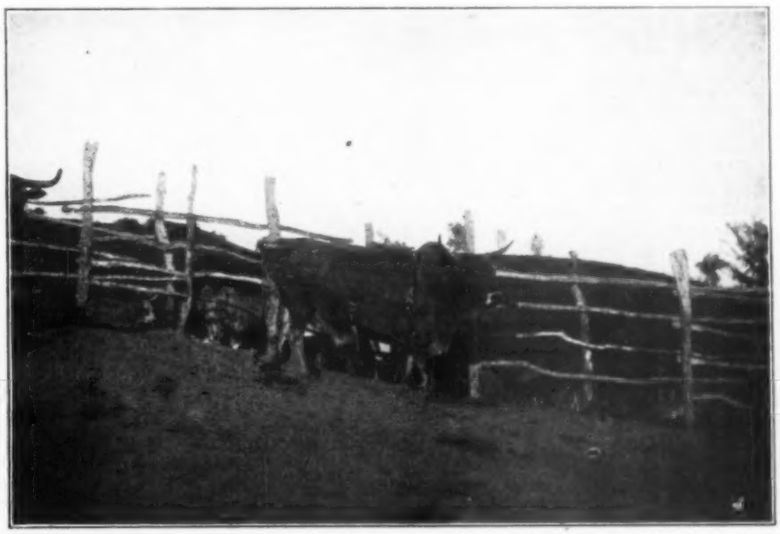
Delivering Milk in Bayamon—From Raymond A. Pearson, U. S. Dept. of Agriculture.

The place where this butter was made was visited and the woman frankly admitted that she beat the "cream" from the milk of her three cows with a stick in a tin pail and added to it some canned Spanish butter. The latter was badly spoiled and gave a strong and most unpleasant flavor to her product.

A government official, who has brought Jersey cows to the island, keeps his table supplied with excellent butter. He uses ice for controlling the temperature of the cream before and during churning and to keep the finished butter cold. There is no reason why good butter cannot be made at any place in Porto Rico where ice is available. The milk of Porto Rico cows is even richer in fat than that from many herds supplying milk to American creameries.



Boy Selling Native Butter in San Juan—From Raymond A. Pearson, U. S. Dept. of Agriculture.

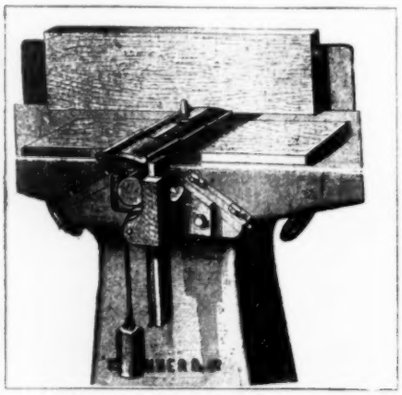


Native Bull of Porto Rico—From Raymond A. Pearson, U. S. Dept. of Agriculture.

SHOP NOTES

SAFETY GUARD FOR HAND PLANERS.

The dangerous planer can be robbed of its terrors by the use of such a guard as was recently introduced in Germany. The guard consists of a telescopic cover forming a bridge over the gap in the table, completely covering the knives, and making it impossible for the hands of the operator to come into contact with the knives. It is instantly adjustable, each section fitting into the other so that the knives can be covered to any extent necessary. To raise or lower the guard it is only requisite to turn one thumbscrew, it being counterbalanced by means of a weight. The guard in no way obstructs the work being done on the machine.



Guard for Planers.

MAGNETS AND BATTERY.

If you wish to use a battery for starting a single cylinder gasoline motor, and then to operate the ignition by means of a generator after the motor is running, the accompanying diagram will show the method of wiring the motor to suit the conditions. Motor Age in describing the process states:

A two-pole double-throw jack-knife switch should be used for this purpose and connected on one side with the battery and the other with the generator. If a four-terminal coil is used one of the secondary wires should be connected with the insulated terminal of the spark plug and the other secondary wire grounded; or it may be connected with the primary wire on the same side of the coil. The dotted lines are to show the completion of the different circuits through the ground on the motor.

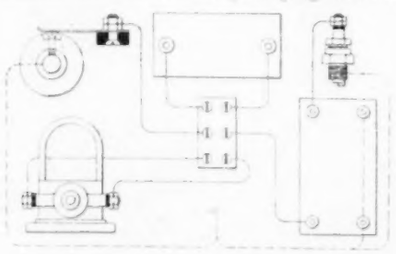


Diagram Showing Method of Wiring Motor.

Popular Mechanics, "the want medium."

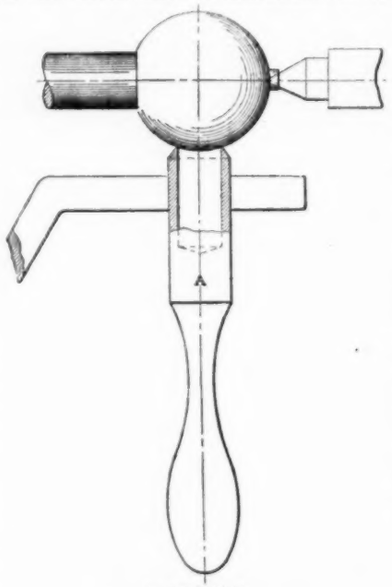
HINTS TO INVENTORS.

The gas companies lose thousands of dollars every year from gas which escapes through the joints in the street mains. Some method to prevent this would be richly rewarded.

TO TURN A PERFECT BALL.

It frequently happens that a perfect ball is desired in certain mechanical movements and unless a special rotary tool rest is provided for the lathe, says an American Machinist contributor, it is a difficult thing to make. I wish to show a tool which I have seen used in a locomotive shop in turning up the ball of a bell clapper. It consists of a round bar of tool steel which is turned up, and has a hole drilled in its center. The end is then chamfered off, as shown, in order to give a cutting edge. The tool is then hardened and tempered in the usual way.

This little tool is interesting from the fact that if placed against a perfect sphere its cutting edge will fit snugly all around, for the reason that the intersection of every plane with a sphere must be a circle. And this circle will fit all different sizes of spheres between certain limits. The ball on a vise screw is a fitting example of its use. It is roughed off to size, and then the tool A is applied by hand and gradually nibbles and cuts off the high part until a perfect sphere is obtained. This process is then continued until the proper diameter is reached. The tool is sharpened by grinding the chamfered edge all around; and by occasionally applying it to a surface plate, one is able to grind the edge perfectly straight.



American Machinist

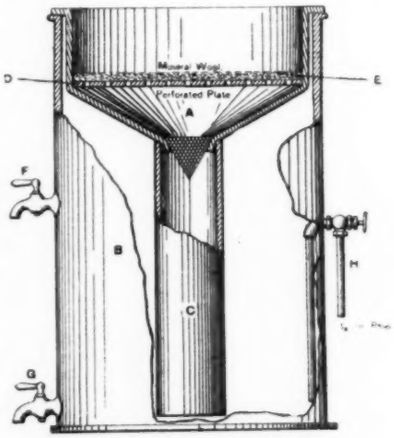
TOOL FOR TURNING A BALL.

The best balloons, such as are used by the war department and the United States weather bureau, are made of coarse silk which the European peasants obtain from the cocoons.

Mount Vesuvius is again in eruption.

HOME-MADE OIL FILTER.

In small plants where the owners do not think they can afford the luxury of an oil filter, a very satisfactory filter can be made from the following directions in the Engineer: The accompanying drawing illustrates an oil filter which the writer made for use in a plant which needed one.



Showing Interior of the Filter.

The tank was of galvanized iron, 14 inches in diameter by 30 inches long. A is a shallow tank made to fit inside of tank B, with a slanting bottom into which the tube C is soldered, the latter being 1½x19½ inches. D is a perforated tin plate, and E is a layer of felt of the same size as the plate. Cock F is placed 14¼ inches above the bottom of the tank and is to draw the oil, and cock G is to drain the tank when necessary.

In action the oil is poured into the receiving tank A, where it drains through the felt and screen, and flows down the inside of the tube C. Passing out from the bottom of the tube, the oil ascends drop by drop to the surface of the water surrounding tube C. The water level is kept constant by means of the overflow pipe H, which is 13 inches long inside the tank and is tapped into the latter at a point 14 inches from the bottom. The valve of this pipe is open at all times to allow the escape of excess water. A gage glass is an addition, but can be dispensed with.

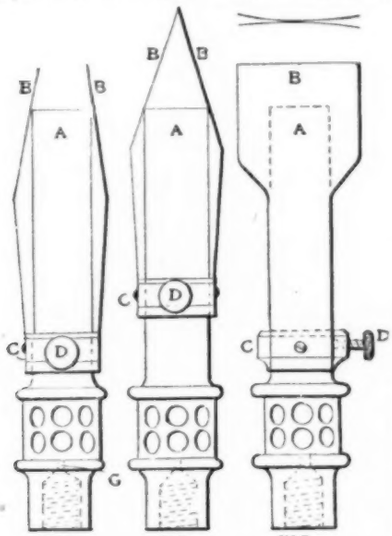
CONSTRUCTION OF WIRE ROPE.

In the ordinary construction of wire ropes the wires forming the strands are twisted to the left hand, but the strands are twisted to right hand, or opposite direction. In the "Lang lay" the wires forming the strands and the strands comprising the rope are all laid in the same direction, says the Mining Press. The average elongation of ordinarily constructed rope is about 3 per cent, and with Lang lay 1½ to 2 per cent. With hoisting ropes the life can be increased by ordering sufficient length to enable about 6 inches to be cut off the end occasionally, thus changing the point of lift or stress. A rope should be greased frequently and carefully with a good quality of lubricant, free from acids.

The steam turbine is a type of rotary engine in which the steam is admitted at one end of a tube, or cylinder, and impinging on vanes, passes from one to the other, driving the shaft to which the vanes are attached.

A COMBINATION BUNSEN BURNER.

For the purpose of heating small articles, either in the tool room or elsewhere, says a writer in the American Machinist,



A COMBINATION BUNSEN BURNER.

the Bunsen burner is quite the thing. Those to be found on the market, however, usually give but one shape of flame, either flat or round as the make may be. Figs. 1, 2 and 3 show a combination burner where the operator can have either round or flat flame. This burner consists of tube A, flat steel pieces B, about 1-32 inch thick, and collar C. The pieces B B are fastened by screws to collar C, which slides up and down on tube A, being held at any point desired by screw D, and can be taken off altogether if desired.

Fig. 1 shows the collar down, with the flat pieces spread apart, which will give a nearly round flame. Fig. 2 shows the collar up, which allows the flat pieces to entirely close, and unless these flat pieces are made something as shown above Fig. 3 (only about one-quarter as much as shown) there will be two streams of blue flame, one from each corner. The air holes are shown at E, Fig. 1. The burner screws on a regular gas pipe at F. The little hole at G is about 1-16 inch diameter.

TO PREVENT NOISY EXHAUST IN GASOLINE LAUNCH ENGINES.

Much of the beauty of a fine gasoline launch is marred by the puff and bang of the exhaust as the boat moves along. An owner of one of these boats tells in the Rudder how he stopped the noise.

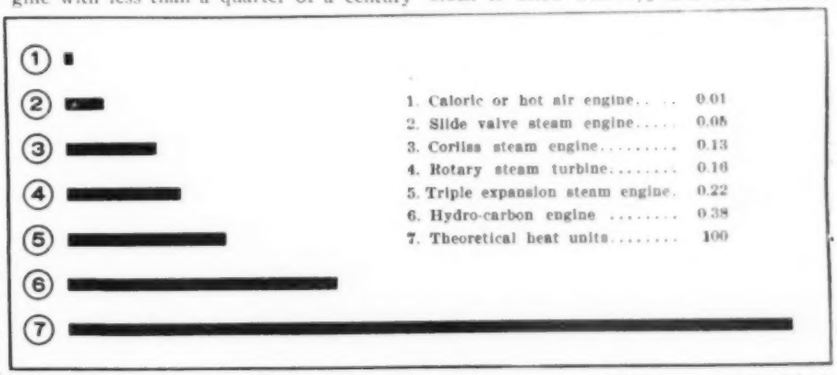
Get a muffler that will not leak water, and then repipe the engine in the following way: From the exhaust connection at the engine lead the pipe down for six or eight inches, then connect the waste water at the lower end. Then lead the exhaust pipe astern for a ways, and then direct it up again and into the top of the muffler. The muffler must be well above the water line. Then from the bottom of muffler lead exhaust pipe down and outboard. This not alone will stop much of the noise, but will keep the whole exhaust pipe cool. This can be done with either two or four-cycle engines, and is well worth the change.

COMPARATIVE EFFICIENCY OF HEAT ENGINES.

A diagram which is much more forcible than any mere table of figures is given in the Motor Age to show the comparative efficiency of the various kinds of heat engines. From this it will be seen that the hot air engine is the poorest and the gas engine, or hydro-carbon (No. 6) is the best.

All engines which derive their power from the combustion of some form of fuel are known as heat engines. They consist of three principal types—caloric or hot air engines, steam engines and gas or hydro-carbon engines, the latter using some form of liquid fuel which is consumed within the cylinder of the engine itself.

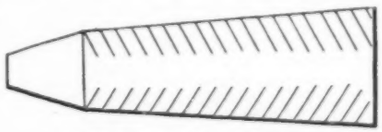
It is interesting to note in this connection that after nearly one hundred years of scientific study and research relative to the steam engine, the gas or hydrocarbon engine with less than a quarter of a century


1. Caloric or hot air engine.... 0.01
2. Slide valve steam engine..... 0.05
3. Corliss steam engine..... 0.13
4. Rotary steam turbine..... 0.16
5. Triple expansion steam engine. 0.22
6. Hydro-carbon engine 0.38
7. Theoretical heat units..... 100

of actual development, stands at the head of all other types of heat engines, in point of efficiency.

TO MAKE A WOOD SPLITTING WEDGE.

To make a wood-splitting wedge, take a piece of steel 1¾ inches square and 3¾ inches long, says the American Blacksmith, draw out the bit first with fulllers, leaving it a little wider at the thin end. Next, draw down for the head to about one inch square. An octagon makes a nicer looking job. It will stand much



A HOME MADE WOOD-SPLITTING WEDGE.

more, and wear longer than if left the full size of stock, for the corners will not split down and fall off as they do in a large-headed wedge. Last, but not least, cut a row of teeth the entire length of the wedge, either by holding in the vise or laying on a block of lead or hard wood.

Woodchoppers say that the teeth make no perceptible difference in driving, and that the wedge sticks very much better, seldom splitting even in frozen wood. The wedge complete weighs about three pounds.

Many fondly thought, says Dr. Linde, that liquid air might be used for the production of power in the place of coal or oil, but they forgot that it is costly to manufacture and not a very efficient source of energy when obtained.

FINISHING SASH AND DOORS IN SMALL FACTORIES.

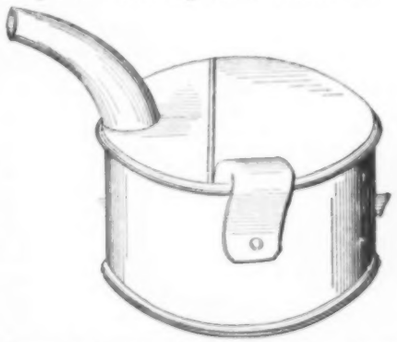
In small factories more time is frequently wasted in fastening an odd-sized

Frame to Hold Sash While Trimming by Hand.

sash or door to the table for the hand trimming, than is spent in the actual work desired. A writer in the Wood-Worker suggests the following which he has used to advantage: It consists of a 2-inch hardwood top, one end of which is fitted with a block 6 inches long, traveling in a groove. The other end of table has a stationary block, which can be moved up the table to suit the size of door. This block is fitted with 1½-inch iron dowels, which correspond with a row of ½-inch holes in middle of table, for adjustment. The door is placed against the stationary block and the sliding block is moved up to the work by a wedge operating between it and the fulcrum, which is bolted immediately behind the block. This block is lipped both above and below the table, and is drawn back by a spring when wedge is removed.

SIMPLE OIL CAN FILLER.

A certain tool room foreman insisted that his department be kept clean, says a contributor to the American Machinist. He got the soldering outfit, selected a tin



dipper and made the oil can filler shown in the cut. The dipper held just a little less than the oil can did. The tool room boy was like most other tool room boys, but he took good care that this little article should not be lost. It made it easier to keep things clean

Popular Mechanics is the medium for inventors.

CROOKEDEST RAILROAD IN THE WORLD.

Strange Serpent-like Line That Winds Its Way to Tamalpais' Summit.

The crookedest railroad in the world is the North Pacific Shore line, which, with 277 curves in a length of 8 1-5 miles, climbs the almost perpendicular height of Mount Tamalpais, 12 miles north of San Francisco. The longest stretch of straight track on this road is 413 feet. It is impossible for a train to endure the bending and twisting of the run and one car has to be taken up at a time. Not only is this the crookedest but it is the longest mountain railroad in the world. It is one-fifth of a mile longer than the Pike's Peak railroad, the next longest, and nearly two miles longer than the longest railroad of the Alps.

The Mount Tamalpais railroad does a big business for the mountain is coming into regard as one of the wonders of the continent. Near its dizzy apex, from which can be viewed the country for 100 miles around, is a strangely curious rock forma-

The Famous Bow Knot—North Pacific Shore Line.

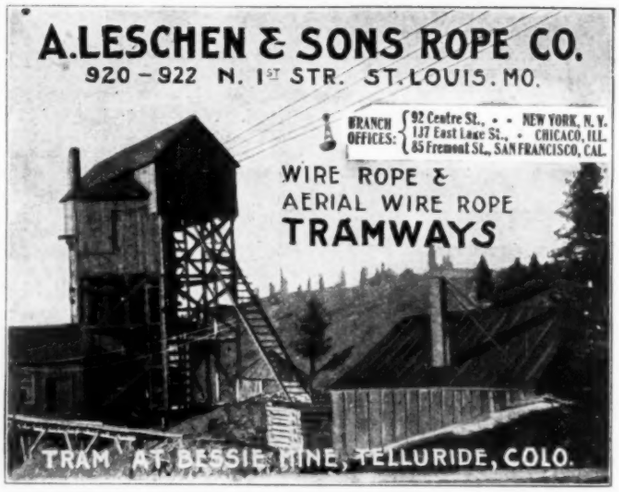
tion, called "the old lady of the mountain." The outlines of a woman's face, carved in the solid rock by nature, are so clear as to imbue all who view it with wonderment.

Mount Tamalpais is 2,592 feet from base to apex and nearly three-fourth mile above the level of the sea. By boat and rail the summit may be reached from San Francisco in two hours. The passenger in the mountain car experiences a thrilling sensation in making the ascent. Higher and higher as each successive curve is rounded he seems as if he were involuntarily being lifted to a realm that is beyond the earth. Broader and grander the view presents itself until he stands on the topmost peak, which almost seems to sway in space as the cloud shadows pass in the valleys below.

No cable or cogged track is used in climbing the mountain, and there are no relay engines. One powerful locomotive performs the remarkable task always faithfully. The distance from the base to the summit is covered in about 40 minutes. No stops are made en route. At one place the road forms the famous bow-knot which may be seen in the photograph.

The manufacture of furniture is a growing industry in the south. Eleven states have 204 factories employing 8,212 operators, with plants costing over seven million dollars. The output has increased 873 per cent in ten years.

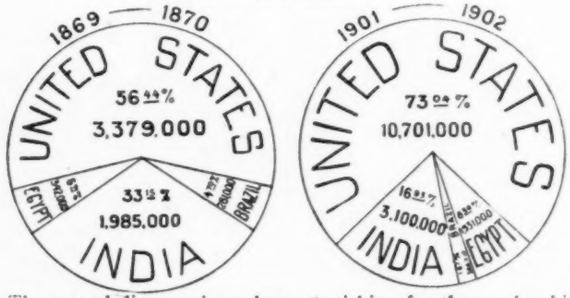
Popular Mechanics "is written so you can understand it."


A.LESCHEN & SONS ROPE CO.
920-922 N. 1ST STR. ST. LOUIS. MO.
BRANCH OFFICES: 92 Centre St., NEW YORK, N.Y.
137 East Lake St., CHICAGO, ILL.
85 Fremont St., SAN FRANCISCO, CAL.
WIRE ROPE &
AERIAL WIRE ROPE
TRAMWAYS
TRAM AT BESSIE MINE, TELLURIDE, COLO.

REMARKABLE INCREASE IN COTTON PRODUCTION.

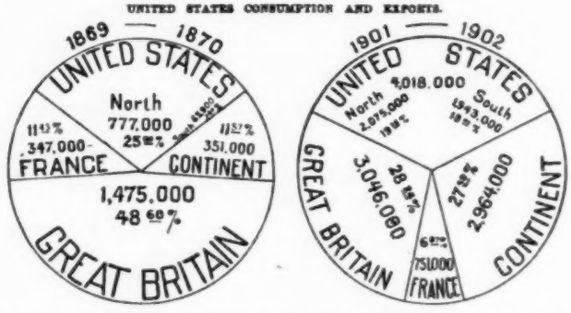
During the past 30 years the value of the cotton crop has increased from three to ten million dollars, and last year we produced 73 per cent of all the cotton raised in the world. India comes next, then Egypt and Brazil. The first diagram shows the comparison of the years 1869-1870 and 1901-2.

SOURCES OF COTTON SUPPLY.



The second diagram is no less astonishing for the south which only manufactured two per cent in 1870, worked up 18 per cent

UNITED STATES CONSUMPTION AND EXPORTS.



in 1902, while the exports to England, France and the continent have fallen off very much.

The French war department has devised an unmounted balloon which it is proposed shall cross the Sahara. Its sole occupants are to be six live pigeons which are to be conveyed in the lower compartment of a small car.

The subsidiary canal which it is proposed to build to connect the Chicago Sanitary canal with the Calumet will cost $11,880,000. The canal is to be 77 feet wide.

In France the navy is experimenting on the use of petroleum briquettes for fuel. The composition is said to be 97 per cent carbon and 3 per cent hydrogen.

THE MANUFACTURERS' BUILDING.

Great in every way will be the Manufacturers' Building at the St. Louis World's Fair. Here the manufacturing interests of America will be shown and there will be exhibits from all the nations on the globe. The imposing building is one of the first the visitor will see when he enters the grounds by the main entrance. It will have a north frontage of 1,200 feet and a depth of 525 feet on the main boulevard. The architects have composed a great tower 400 feet high to stand at the angle of the main facade facing north. This prominent feature gives an appropriate balance with a tower of corresponding height on the Varied Industries Building immediately west.

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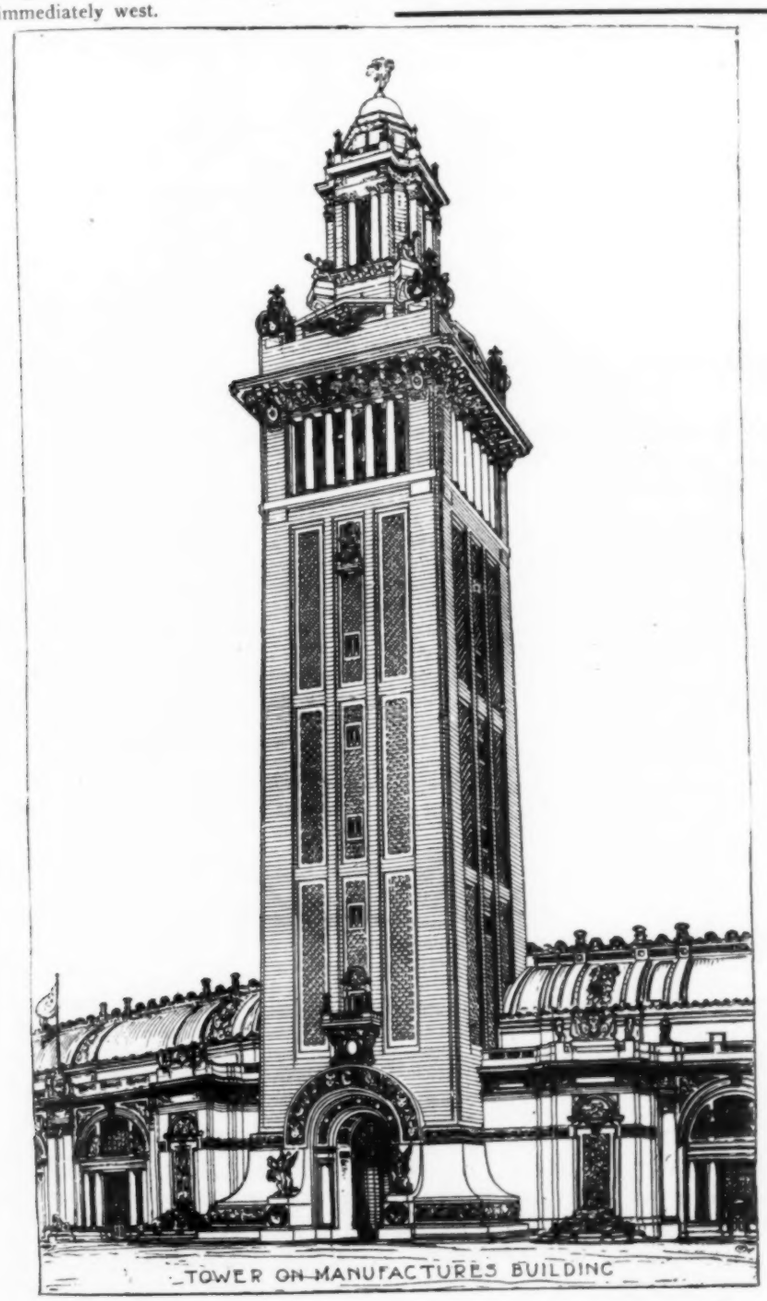

TOWER ON MANUFACTURES BUILDING

PECULIARITIES OF THE BLACK SEA.

The Black Sea differs in a most remarkable manner from other seas and oceans. A surface current flows continually from the Black Sea into the Mediterranean, and an undercurrent from the Mediterranean into the Black Sea. The latter current is salt, and being heavier than the fresh water above it, remains stagnant at the bottom. Being saturated with sulphuretted hydrogen, this water will not maintain life, and so the Black Sea contains no living inhabitants below the depth of about 100 fathoms. The deeper water, when brought to the surface, smells exactly like decayed eggs.

TO PROPERLY DISINFECT.

These excellent practical hints on the proper method of disinfecting were given by Dr. Eli Grimes in his report to the Iowa State Board of Health:

Everything that goes out of a sick room should be disinfected before it goes. This applies to the doctor and nurse as well as to the soiled linen. Kill the flies. Before disinfecting, make the room as nearly air-tight as possible. Don't attempt to disinfect books. Burn them. Don't trust sulphur gas or formaldehyde gas to penetrate heavy fabric.

Every carpet, rug and bed quilt should be sprinkled with a four per cent. formaldehyde solution and tightly packed away for twenty-four hours. They will then be disinfected. Treat wearing apparel the same way.

Sprinkle the walls, floors and suspended sheets with 40 per cent. formaldehyde, using one-half pound for every 1,000 cubic feet of room space; close the door for a day and it is disinfected.

Formaldehyde is better than sulphur. Disinfection should be done thoroughly or it is useless. Disinfection is to save life.

THE MACHINERY PROVED TO BE HUMAN FREIGHT.

Stowaways on ocean vessels are still not uncommon, but it is seldom a man tries to ship himself in a box as freight, while alive. Recently a suspicious box marked "machinery" and addressed to Chicago, was opened in a New Orleans freight house. The box was six feet long, three feet wide and three feet high. Upon opening the box two men were found with provisions and water sufficient to last during the trip.

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Owing to the increasing demand for our gas and gasoline engines and our limited facilities for manufacturing, we offer for sale our complete Gas Engine business, including patterns for eleven different sizes castings, jigs tools, patents, etc. Engine has been on the market for 7 years and bears an excellent reputation. For further particulars address

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The "Poor" Farmer Yesterday and Today

In the past ignorance and isolation
In the present intelligence and information
—Chicago Tribune

GRAMOPHONE AT A FUNERAL SERVICE.

Minister Who Used It Advocates the Talking Machine for Funerals, Weddings, Lodges and Other Ceremonies.

By the Rev. Samuel Pearson of the First Congregational Church, Leavenworth, Kan., the first minister to use the gramophone for music at a funeral service.

The use of the gramophone at the funeral of Daniel P. Williams, in Leavenworth, came about in this way: It was a question of economy from the doctor to undertaker—one of those cases where a poor man can not afford to die. The clergyman was donating his services willingly. It was a dull day and the roads muddy. The residence was on the outskirts of the city and difficult to reach without a conveyance. As a soloist or choir would involve carriage-hire, even if the singers donated their services, the idea of using the gramophone suggested itself.

No objections were proffered when the clergyman reached the residence and explained that he would like to test its utility. So the service was opened by the selection, "The Holy City," and concluded with "My Jesus as Thou Wilt." It was the first time the clergyman had handled such an instrument as doubtless it was the first use of the gramophone at such a service. There were about thirty people present and the innovation did not appear to provoke surprise, or unfavorable comment. On the contrary, the possibility of this substitute rendering a useful service under similar circumstances was apparent, and the clergyman in this instance received the cordial thanks of those interested for so doing. A sick man lay in an adjoining room and enjoyed the music so much that had the clergyman owned the machine he would have left it to play for his benefit, and procured more discs.

There is no reason why a wise use of this wonderful instrument may not render efficient service at funerals. Its use heretofore has been confined to purposes of amusement and at home and in public concert, and entertainments.

In the light of the present possibilities of this instrument, undertakers and sextons may do by proxy this service, where the services of a clergyman are not obtainable or perchance not desired.

Fraternal societies and lodges with a burial ritual can do the same, with advantage on the side of the gramophone, where the lodge chaplain is a poor reader. Why not? What applies to the undertaker above is also applicable to those authorized to conduct weddings. All the law requires is that the person authorized to perform marriage ceremony ask and hear affirmed the vital question, "Wilt thou,' and "I will," or an affirmation, in response.

In a few years these and endless other uses will be served, without attracting notice, when the talking machine has been simplified, adapted, perfected and brought into public use, like the telegraph, the telephone and the printing press.

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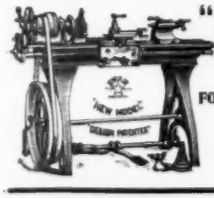

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LAMENT OF THE SECTION BOSS.

Me father, me brothers, says Danny, the boss,
And all of me kin thot Oi iver have known
Has worked on the road since they laid the first tie.
Revered and renowned is the name of Malone.
For twinty-wan years on the siction Oi've toiled,
In the rain and the shine, in the summer and fall;
Because Oi was worthy, the roadmaster said,
They put me in here as the boss of thim all.

Sure, me loife was contint when Oi worked on the road,
And niver so much as a kick did Oi make;
But now Oi could quit any time of the day
When Oi think of me head an' the way it does ache;
For it's aisy to do what the siction boss sez,
But, arrah, when you're bossin' a hundred or two
It's different sure; it's the truth thot Oi spake,
For it's h— if you don't and its' h—if you do.

First the roadmaster comes an' he looks at the job.
Sure, sez he, you're not doin' this track-layin' right;
But it's Mister White's blue print, sez I, Mr. Flynn.
Domn the blue print, sez he, domn the print an' domn White.
Faith, ye'll do ex Oi tell you or git off the job.
Sure Oi will, Mister Flynn, sez I, bowin' a few;
And the Chafe Ingineer raises Nid the nixt day.
Sure it's h— if you don't and it's h— if you do.

Thin the Superintender comes 'long in his car.
Phwhat the hell is the matter? Look here, Dan Malone.
But the Chafe Ingineer give the orders, sez I.
Domn the Chafe Ingineer; let him lave you alone.
Thot's the way they go on, sure I'm spaken the truth;
For the poor siction boss has of troubles a few.
Sure, Oi'd rather be back tampin' ties by the day,
For it's h— if you don't and it's h— if you do.
—Roadmaster and Foreman.

THE FISH CODGERS OF ICELAND.

To the Icelanders, particularly the shore-dwellers, the advent of the steam trawler has meant much. They wrested a bare living from the sea by fishing for cod with lines from an open boat, and curing the fish thus dearly caught upon the beach. It was a severe life, rendered not the less hard by the necessity of bartering the dried fish for goods and provisions with the storekeeper of the nearest town. Then came the steam trawler, towing its capacious net and hauling up at short intervals huge bags of fish that must have made the mouths of the hard-pressed Icelanders to water, says Black and White. In every bag of fish that the trawler hoists aboard there must, of course, be a certain proportion of small and coarse fish unsuitable for the home market. Herein lies the Icelander's opportunity. Putting off from the shore in his curious craft, he rows or sails from ship to ship, and in exchange for whiskey (imported), cigars (of indescribable flavor and aroma), lager beer (bottled in Reykjavik), or even home manufactures, such as slippers of sheep or sealskin, receives a freight of the rejected fish. This he carries home—codling, coal-fish, skate, dogfish, lump-suckers, nothing comes amiss—and cures (as the exceptional combination of warm sun and cold atmosphere during the brief Iceland summer enables him to do to perfection) upon the beach.

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DEVICE TO STERILIZE BEDS

A bed sterilizer has been invented by Robert Allen, a colored employe of Erlanger hospital, Chattanooga, Tenn. The device is so constructed with hot water pipes ramifying throughout it that when a bed with all the linen is placed therein the heat is of such a nature that all vermin are destroyed, and the linen is in as perfect condition as if it had gone through a laundry.

The sterilizer has proven to be a splendid arrangement in case of diphtheria or any epidemic of such a nature, and the bed with all linens and clothing that have come in contact with the patient can be placed in the sterilizer, and in thirty to sixty minutes every germ is killed. The sterilizer has been thoroughly tested, and has given entire satisfaction.

The invention is not only adapted to the use of the sick room, but it can be successfully used in a hotel. It can also be used with advantage in all jails, asylums, hospitals, etc., and is said to be very useful for sanitation purposes.

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